R E P O R T R E S U M E S

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THE PREPARATION OF A ROADSHOW VERSION OF "THE TECHNOLOGICAL REVOLUTION IN EDUCATION."

BY- FINN, JAMES D.
NATIONAL EDUCATION ASSN., WASHINGTON, D.C.

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THE PROBLEM OF THIS STUDY WAS TO PREPARE A PLAN WHICH WOULD PERMIT AN ECONOMICAL AND RELIABLE SHOWING OF THE CONTENT OF A MULTIMEDIA PRESENTATION ENTITLED "THE REVOLUTION IN INSTRUCTION." IT WOULD BE DIFFICULT, IF NOT IMPOSSIBLE, TO PACKAGE THE PRESENTATION IN THE FORM AS IT CURRENTLY EXISTS. THE REPORT PROVIDES A RATIONALE FOR THE SELECTION OF MEDIA, PACKAGING, MAINTENANCE, AND SOME OF THE ADMINISTRATIVE PROBLEMS INVOLVED IN ACHIEVING THE OBJECTIVE. THE RECOMMENDATION MADE WAS THAT THE U.S. OFFICE OF EDUCATION PRODUCE A SOUND FILMSTRIP WHICH COULD BE EASILY SHIPPED, WITH OR WITHOUT EQUIPMENT, AND USED ANYWHERE ELECTRICITY IS AVAILABLE. (JC)

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TDP —— NEA —— USOE

National Education Association

TECHNOLOGICAL DEVELOPMENT PROJECT

headquarters:

LOS ANGELES FACILITY

School of Education
University of Southern California
Los Angeles 7, California

WASHINGTON FACILITY

National Education Association
1201 Sixteenth Street, N.W.
Washington 6, D.C.

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The Preparation of a Roadshow Version of "The Technological Revolution in Education"

prepared by
the Staff of the Technological Development Project
for the
New Media Demonstration Center
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(Document #14, Contract #SAE-9073)

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Introduction

"The Revolution in Instruction" was a multi-media presentation prepared for the New Media Demonstration Center of the U.S. Office of Education, and involved in excess of three hundred 2 x 2 inch slides, six motion picture clips, several tape cuts and recordings, and a device for obtaining audience response. The equipment used included four Eastman Carousel projectors, one 16mm motion picture projector, one tape recorder, one record player, public address equipment, and two screens. Such a presentation can be controlled and maintained when installed in a facility such as the New Media Demonstration Center; it would be difficult, if not impossible, to package such a presentation in the form used in the Center for shipment around the United States as a roadshow presentation without personnel to set up and operate the complicated equipment and make the interstitial comments and answer questions.

The problem presented by the New Media Demonstration Center to the staff of the TDP was to prepare a plan which would permit economical

and reliable roadshowing of the content of "The Revolution in Instruction," saving as many of the values of the multi-media presentation as possible. The report that follows provides a rationale for the selection of media, packaging of materials, maintenance, and some of the administrative problems involved in achieving this objective. It makes only passing reference to the cost and problems in producing the materials, being concerned primarily with packaging and distribution.

Rationale

There are any number of possibilities for creating a traveling audio-visual presentation, many of which have been demonstrated as effective in industrial, military, and educational use. The U.S. Office of Education, for example, has had a very successful traveling exhibit on programed instruction on the road for over a year. For the particular purposes of presenting the content of "The Revolution in Instruction," the recommendation of the Project is that the U.S. Office produce a sound filmstrip that can easily be shipped, with or without equipment, and used anywhere there is electricity. The rationale of this recommendation follows.

First, it is assumed that the presentation would often be made in locations where equipment was available to the local group. This means that only materials need be shipped, providing the materials are simple enough--such as a motion picture or filmstrip. Second, it is assumed

that there will be many important showings to groups that, for one reason or another, do not have equipment. Here, the problem becomes one of supplying the equipment in addition to the materials, with all that this means in terms of cost, weight, etc. There are, however, many considerations involved in these two assumptions. There is, for example, the audience.

The Audience. The size and type of group served by this program would be extremely variable. It might include Parent-Teacher Associations, school administrators, teachers, principals, teachers' colleges, state departments of education, chambers of commerce, clubs, lodges, unions, church groups, and almost any public body concerned with education and public welfare. These groups might number two to two thousand and include a great diversity of interests and levels of education.

Economics. No large scale information program can afford to proceed without investigating both cost and effectiveness. Cost per viewer is relatively easy to determine, but effectiveness can only be estimated by pretesting the materials with sample audiences, and setting up a long-term evaluation program. Provision should be included for periodic updating and revision on the basis of audience reactions.

The economic factors to be considered include:

a. cost of producing materials to provide the master copies;

b. cost of duplicate copies;

c. cost of equipment when it is to be supplied;

d. repair and maintenance costs; and

e. administration, booking, and shipping.

Since different presentation media would involve different cost scales, these will now be examined in detail.

a. Initial production costs. It is difficult to suggest definite cost figures, but for a 16mm motion picture these would seem to range from about $60 to $6,000 a minute. The variability in cost would be related to the quality of production, the use of sound, color, animation, and other techniques to increase effectiveness, and the difficulty of obtaining the visual materials. In general, the cost of a sound filmstrip would be about two-thirds that of a motion picture, and sometimes less.

b. Cost of duplicate copies. In a large dissemination program the cost of duplicates may well be more significant than the initial production cost. Table I compares the relative cost of materials for color film presentations using 16mm sound motion pictures, 8mm sound motion pictures, slides (2 x 2) synchronized with magnetic tape,

TABLE I

RELATIVE COST OF FILM MEDIA USING SOUND AND COLOR

Media	Picture duplicates		Container plus reel or magazine where applicable		Tape or disc where applicable	
	10 minutes	50 minutes	10 minutes	50 minutes	10 minutes	50 minutes
16mm sound motion picture from color internegative[1]	$ 28.50	$ 142.50	$ 2.00	$ 3.00	----	----
8mm sound motion picture reduced from 16mm color internegative[2]	22.80	114.00	1.50	3.00	----	----
35mm slide duplicates from reversal color positives[3]	7.50	37.50	1.50	5.00	tape $ 1.50	$ 4.00
35mm filmstrip from color internegative[4]	0.75	3.75	0.25	0.50	disc 0.40	1.00

[1]Based on prices supplied by Consolidated Film Industries, Hollywood.

[2]Based on prices supplied by General Film Labs, Hollywood.

[3]Based on Kodak duplicating cost for slides.

[4]Quotation from Frank Holmes Laboratories, San Fernando.

and 35mm filmstrips synchronized with microgroove disc recordings. Costs are based on printing in lots of ten with the exception of disc recordings which would be pressed in lots of one hundred. Note that only slight savings are possible at the present time using 8mm sound film, while the filmstrip and record cost significantly less than the alternate media.

Since some media are more subject to wear and damage than others, absolute costs must be related to the probable life of the materials. Table II lists the estimated life and cost per usage.

TABLE II

USEFUL LIFE AND RELATIVE COST PER USAGE

	Estimated life in number of uses[1]	Cost for 10 minutes	Cost per use for 50 minutes (based on Table I)
16mm motion picture	100	$ .30	$ 1.45
8mm motion picture	50	.47	2.34
35mm slides and tape	40	.21	1.03
35mm filmstrip and disc	15	.07	.32

[1]The estimated life is much less than normal, since the materials would often be subject to damage from out-of-adjustment machines and inexperienced operators.

Note that on a cost-per-usage basis 8mm film would not necessarily represent a saving, while the filmstrip and record, despite their

limited life, have a decided cost advantage over the other media. This should be weighed against the possibility of losing synchronization between picture and sound using this method, particularly where manual operation of the projector is involved.

c. Cost of equipment. Since the purchase and maintenance of equipment could become a major item of expenditure, it would be preferable to choose a communication medium which was already in widespread use. It is assumed that in many instances school equipment might be used for the presentation. Reference to surveys by Godfrey and Finn and Perrin indicates that record players and filmstrip projectors are relatively common, with 16mm sound motion pictures a close third.[1] There is approximately one record player for every four teachers, one filmstrip projector for every seven teachers, and one motion picture projector for every ten teachers in the United States public schools.

Where it is necessary to supply equipment, the operation of a filmstrip projector would be easier to learn than operation of a motion picture projector. Also, the filmstrip unit would be less costly and weigh less for shipping.

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[1]See, for example, Finn, James D., Donald G. Perrin, and Lee E. Campion, Studies in the Growth of Instructional Technology, I: Audio-Visual Instrumentation for Instruction in the Public Schools, 1930--1960; A Basis for Take-Off, Occasional Paper No. 6 of the Technological Development Project, National Education Association.

The question of automatic or manual advance of the filmstrip deserves close consideration. Table III gives some typical cost figures and utilization factors. It is suggested that a screen width of five feet and a sound system of at least 2 1/2 watts would be desirable for audiences of one to two hundred persons. The 8mm film projector is limited in its light output and would be below the recommended screen brightness on a five-foot wide screen. The least costly outfit would be a record player and manual filmstrip projector, although the DuKane Micromatic unit with automatic film advance is also worthy of consideration.

Table III requires further interpretation. The average cost of 8mm projectors is about $200 less than the 16mm machines, with a proportional scaling down of sound and light output. At the present state of the art, the average 8mm sound projector would not be suitable for audiences larger than fifty to sixty persons. The automatic sound-slide equipment does not compare favorably with 16mm motion picture projectors for price, possibly because it uses tape decks for sound in every instance. Also, slides are sometimes subject to jamming in the machine, or they can get out of order if dropped. Automatic sound-filmstrip projectors sell for about half the cost of a motion picture projector (except for the DuKane auditorium model which is relatively expensive). Use of a manual projector in combination with a record

TABLE III

SOME TYPICAL FIGURES FOR EQUIPMENT COSTS

Projector	Cost ($)	Weight (lbs.)	Capacity (mins.)	Maximum recommended screen size (feet)	Amplifier (watts)	Speaker (inches)
16mm SOUND MOTION						
Bell and Howell	625	29	55	8	not stated	4 x 6
Eastman Kodak	499	33	55	8	8	11 x 6
Graflex	559	42	55	8	15	8
Radio Corporation (RCA)	554	38	55	8	15	8
Victor	525	-	55	8	15	5 x 7
Average	550	36	55	8	12	8
8mm SOUND MOTION						
Eastman	345	30	24	4	2 1/2	10 x 2
Fairchild	259	27	24	4	2 1/2	6
Tanberg	365	20	24	4	6	6
Average	325	26	24	4	3	6
AUTOMATIC SOUND SLIDE						
LaBelle	525	42	10-15	10	5	8
Lectron	445	23	10-15	10	not stated	
Synchromat	340	37	10-15	10	4	6 x 9
Average	440	34	10-15	10	4	8

TABLE III (continued)

Projector	Cost ($)	Weight (lbs.)	Capacity (mins.)	Maximum recommended screen size (feet)	Amplifier (watts)	Speaker (inches)
AUTOMATIC SOUND FILMSTRIP						
DuKane Micromatic	230	24	50	6	2	4 x 6
DuKane Auditorium	499	54	50	13	10	6 x 9
LaBelle	270	28	15	6	2 1/2	5
Average	335	35	35	8	5	6
MANUAL SOUND FILM-STRIP						
Victor Soundview	262	28	15	8	2	8
Viewlex Viewtalk	193	27	15	8	3 1/2	6 x 9
Audio-Master	100	20	15	4	4	5
McClure	120	-	15	4	2 1/2	4
Richard Mnf	80	15	15	4	3	4
Average	150	22	15	6	3	6

player reduces the equipment cost to about one-third that of a 16mm motion picture projector.

The cost and weight advantages of the filmstrip as compared to the motion picture make it the most desirable combination for transmitting audio-visual messages under the assumed circumstances at this point in time. It is possible that 8mm sound film will rival it at some time in the future, particularly with the development of cartridge-loading machines which are self-threading.

Another question is whether to adopt a manual filmstrip projector or one which is advanced automatically by a tone on the record. The manual advance is simpler and less likely to mechanical failure, but demands the constant attention of the human operator. The automatic system, once set up and started, will take care of itself. The equipment is slightly more complex, but is highly reliable in operation. Referring to specific units, the Viewlex Viewtalk has a 500 watt lamp and a 3 1/2 watt sound system feeding a 6 x 9 speaker. It takes records up to 12 inches in diameter, and its principal limitation is the length of filmstrip. Since there is no winding mechanism to take up the film, the use of strips longer than five or six feet (70 frames) is not recommended. The price is $193 list. A similar unit with a 5 watt amplified lists for $230.

The DuKane Micromatic features automatic advance and a winding mechanism for the projected film. It uses a 300 watt lamp and a 2 watt

amplifier feeding a 4 x 6 built-in speaker. It would ideally be used with an extension speaker. Cost is $230 for the basic unit, and $30 for the extension speaker which clips onto the bottom of the case. It is suggested that whichever system is adopted all records be made in duplicate, one side with audible signals for manual advance and the other with inaudible tones for automatic machines.

Note also the possibility of using a small low-cost combination such as the Poly-Vue manufactured by Richard. Costing only $80 list, it would be ideal for groups of twenty to thirty persons. The problem, then, is whether to standardize on a single unit, or to adopt several units. For large presentations an automatic auditorium unit such as the DuKane Auditorium combination would be invaluable even though it might have no more than a dozen uses in the course of a single year. Units such as the Micromatic or the Viewtalk would meet the majority of situations, while the Poly-Vue could serve small groups. Since the majority of users would already have record players and filmstrip projectors, there would be a need for numerous sets of materials but relatively few packages containing equipment. The various packages might include the following:

<u>Materials Only</u>

1. 2 filmstrips (parts I and II of presentation)
   2 twelve-inch records
   50 handouts (throwaways)
   1 program guide with instructions

   Cost - under $10

Small Group

2. Materials as above
1 Richard Poly-Vue projector and record player combination
1 spare lamp
1 instruction book
1 heavy duty fiber packing case

Cost - under $125

Medium Group

3. 1 set materials as in 1 above
1 Viewlex Viewtalk manual projector and record player combination
1 spare lamp
1 instruction book
1 heavy duty fiber packing case

Cost - under $235

Medium Group

4. 1 set materials as in 1 above
1 DuKane Micromatic automatic projector and record player combination
1 extension speaker for same
1 spare lamp
1 instruction book
1 heavy duty fiber packing case

Cost - under $300

Auditorium

5. 1 set materials as in 1 above
1 DuKane Auditorium combination automatic projector and record player
1 spare lamp
1 instruction book
250 extra copies of handout materials
1 heavy duty fiber packing case

Cost - under $550

d. Repair and maintenance costs. The degree of repair and maintenance work would depend on the type of equipment, how often it was used, the degree of training of the operator, and the incidence of damage in shipping. Proper packaging should eliminate damage in all but the most extreme cases of rough handling in transit. Since the materials are also subject to wear and damage, a regular replacement schedule is to be strongly recommended. Filmstrips and records should be inspected after every usage and replaced (or repaired) whenever there is a sign of damage.

The cost of spare lamps, regular checkover, and occasional repairs would possibly total about 25 per cent of the initial cost of the equipment for any one year. To insure optimum working efficiency, the equipment should be retired after one hundred usages[2] or every four years, whichever should occur first. Assuming the maintenance would add 100 per cent to the initial purchase price over the period of its useful life, the equipment cost per usage would be as follows:

1.	Richard Poly-Vue	$ 2
2.	Viewlex Viewtalk	4
3.	DuKane Micromatic	5
4.	DuKane Auditorium	10

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[2]A usage is defined as shipping the equipment out and return, however many times the filmstrip is shown.

The cost of shipping would almost double this cost in many instances.

e. Administration, booking, and shipping. It is assumed that the New Media Demonstration Center, U.S. Office of Education, would administer the project in its initial stages, and supply a booking clerk with the necessary facilities for storage and shipping. If the plan ever grew to a very large scale information program it might be more economical to ship equipment from regional offices or to contract for distribution, since shipping might represent a significant proportion of the budget.

Professional journals and mailings would notify possible users of the existence of the program, and supply information on new materials (and services) as they were added, or any changes or deletions. Schools and local libraries would be key groups in disseminating news of the program, and these might well become the groups authorized to borrow the materials and equipment. An order blank should accompany all brochures or advertising materials.

When the package includes equipment, it will not usually be possible to send it parcel post because of size and weight restrictions. Table IV gives the maximum size and weight for parcel post within the continental United States.

TABLE IV

MAXIMUM SIZE AND WEIGHT--PARCEL POST

Distance	First Class Post Office[1]		Other Post Offices	
	Maximum size	Maximum weight	Maximum size	Maximum weight
Within 150 miles	72"[2]	40 lb.	100"[2]	70 lb.
Beyond 150 miles	72"[2]	20 lb.	100"[2]	70 lb.

[1]Since most official post offices in the continental United States are first class offices, this would apply to all but the most secluded areas.

[2]Size is measured as girth plus length, the length being the longest dimension.